

CLAIMS

What is claimed is:

- 5 1. An extrusion head for continuous extrusion of molten polymer in a predetermined cross-sectional shape, the molten polymer being supplied from a source, the cross-sectional shape including at least one lumen, the head comprising:
- a) an extrusion tip having an outer surface;
- b) an extrusion die surrounding said tip and having an inner surface cooperating
10 with said tip surface to define a flow channel therebetween, said flow channel defining a direction of flow of said molten polymer in said head; and
- c) at least one lumen pipe assembly extending through a wall of said die into said flow channel, said pipe assembly having a first portion extending transversely of said flow direction and a second portion extending parallel to said flow direction, said first
15 and second pipe portions being joined at a right angle.
2. An extrusion head in accordance with Claim 1 further comprising means for adjusting the radial position of said lumen pipe assembly in said flow channel.
- 20 3. An extrusion head in accordance with Claim 2 wherein said means for adjusting includes a pin vise mounted in said wall of said die.
4. An extrusion head in accordance with Claim 2 wherein said means for adjusting includes a removable gauge block.
- 25 5. An extrusion head in accordance with Claim 2 wherein said extrusion tip includes an axial passage therethrough.

6. An extrusion head in accordance with Claim 1 wherein said first and second lumen pipe portions are each provided with a 45° miter and are joined by welding along said miters to form said right angle.

5 7. An extrusion head in accordance with Claim 1 wherein said right angle joining has zero radius of curvature.

8. An extrusion head in accordance with Claim 1 wherein said extrusion tip is an element of a mandrel having a conical portion adjacent said extrusion tip, and
10 wherein said extrusion die includes a conical surface adjacent said die inner surface, said conical portion and said conical surface cooperating to define a conical flow channel adjacent said flow channel containing said lumen pipe.

9. An extrusion head in accordance with Claim 1 comprising a plurality of
15 said lumen pipes.

10. An extrusion head in accordance with Claim 1 wherein said extrusion die comprises first and second parts joinable along mating surfaces thereof, and wherein said lumen pipe assembly is disposed in features formed in at least one of said
20 mating surfaces.

11. An extrusion head in accordance with Claim 1 wherein said outer surface and said inner surface are cylindrical and said flow channel is annular.

25 12. An extrusion head in accordance with Claim 1 wherein said extrusion head is a crosshead.

13. An extruded element having a cross-sectional shape including at least one lumen and being formed by an extrusion head comprising:

a) an extrusion tip having an outer surface;

b) an extrusion die surrounding said tip and having an inner surface cooperating with said tip surface to define a flow channel therebetween, said flow channel defining a direction of flow of said molten polymer in said head; and

5 c) at least one lumen pipe assembly extending through a wall of said die into said flow channel, said pipe assembly having a first portion extending transversely of said flow direction and a second portion extending parallel to said flow direction, said first and second pipe portions being joined at a right angle.

10 14. An extruded element in accordance with Claim 13 and having a plurality of said lumens, wherein different of said lumens contain different materials.

15 15. An extrusion head for continuous extrusion of molten polymer in a predetermined cross-sectional shape, the molten polymer being supplied from a source, the cross-sectional shape including a plurality of lumens, the head comprising:

a) an extrusion tip having an outer surface;

b) an extrusion die surrounding said tip and having an inner surface cooperating with said tip surface to define a flow channel therebetween, said flow channel defining a direction of flow of said molten polymer in said head, wherein said extrusion die
20 includes first and second parts joinable along mating surfaces thereof;

c) a distribution manifold formed in at least one of said first and second die parts and including a plurality of runners; and

d) a lumen pipe assembly extending from each of said runners into said flow channel and being clamped between said mating surfaces, each one of said pipe
25 assemblies having a first portion extending transversely of said flow direction from said runner and a second portion extending parallel to said flow direction, said first and second pipe portions being joined at a right angle.

16. An extrusion head in accordance with Claim 15 further comprising means for adjusting the radial position of said lumen pipe assemblies in said flow channel.

5 17. An extrusion head in accordance with Claim 16 wherein said means for adjusting includes a removable gauge block.